

Ecological site EX043B23B178 Wetland (WL) Absaroka Upper Foothills

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General information

Provisional. A provisional ecological site description has undergone quality control and quality assurance review. It contains a working state and transition model and enough information to identify the ecological site.

MLRA notes

Major Land Resource Area (MLRA): 043B–Central Rocky Mountains

Major Land Resource Unit (MLRA) 43B: Central Rocky Mountains

43B – Central Rocky Mountains – The Central Rocky Mountains extends from northern Montana to southern extent of Wyoming and from Idaho to central Wyoming. The southern extent of 43B is comprised of a combination of metamorphic, igneous, and sedimentary mountains and foothills. Climatic changes across this extent are broad and create several unique breaks in the landscape.

Further information regarding MLRAs, refer to: United States Department of Agriculture, Natural Resources Conservation Service. 2006. Land Resource Regions and Major Land Resource Areas of the United States, the Caribbean, and the Pacific Basin. U.S. Department of Agriculture Handbook 296.
Available electronically at: http://www.nrcs.usda.gov/wps/portal/nrcs/detail/soils/ref/?cid=nrcs142p2_053624#handbook.

LRU notes

Land Resource Unit (LRU) 43B23B: Absaroka Upper Foothills

Based on the shifts in geology, precipitation patterns and other climatic factors, as well as elevations and vegetation, the Absaroka Range was divided into LRU 23. Further division of this LRU is necessary due to the gradient moving from the foothills to the summit, as well as aspect shifts (north/east face versus south/west face). Subset B is set for the higher elevations within the foothills, with 15 to 19 inches of precipitation. To verify or identify Subset B (the referenced subset for this ecological site), refer to the Wyoming LRU matrix key contained within the Ecological Site Key.

This particular LRU/Subset occurs along the eastern foothills of the Absaroka Range. This LRU starts north of Clark, WY and runs to the Thermopolis, WY area. Once the foothills cross into the Northern Beartooth Range, the climatic patterns and elevational changes shifts the plant community and allows for a break in LRU's near the Montana state line. As the LRU follows to the south and then tracks east to the intersection of the Absaroka Range and the Owl Creek Range, the face changes aspect and geology creating a shift in plant dynamics and a break in the LRU.

The extent of soils currently correlated to this ecological site does not fit within the digitized boundary. Many of the noted soils are provisional and will be reviewed and corrected in mapping update projects. Other map units are correlated as small inclusions within other MLRA's/LRU's based on elevation, landform, and biological references.

Moisture Regime: Typic Ustic

Temperature Regime: Frigid

Dominant Cover: Rangeland – Sagebrush Steppe (major species is Mountain Big Sagebrush)

Representative Value (RV) Effective Precipitation: 15-19 inches (381 – 483 mm)

RV Frost-Free Days: 37 - 80 days

Classification relationships

Relationship to Other Established Classification Systems:

National Vegetation Classification System (NVC):

2 Shrub & Herb Vegetation Class

2.B Temperate & Boreal Grassland & Shrubland Subclass

2.B.2 Temperate Grassland & Shrubland Formation

2.B.2.Na Western North American Grassland & Shrubland Division

M048 Central Rocky Mountain Montane-Foothill Grassland & Shrubland Macrogroup

G273 Central Rocky Mountain Lower Montane, Foothill & Valley Grassland Group

Ecoregions (EPA):

Level I: 10 North American Deserts

Level II: 10.1 Cold Deserts

Level III: 10.1.18 Wyoming Basin

Level IV: 10.1.18.d Foothills and Low Mountains

Ecological site concept

- Site is controlled by a water table that is above the soil surface for part but not all of the growing season.
- Slope is < 6%.
- Soils are:
 - o Textures range from Silt Loam to clay in top 4" (10 cm) of mineral soil surface
 - o Clay content is <40% within the top 4" (10 cm) of mineral soil surface
 - o All subsurface horizons in the particle size control section have a weighted average of <60% clay. (The particle size control section is the segment of the profile from either the start of an argillic horizon for 50 cm's or from 25-100 cm's).
 - o Moderately deep to very deep (20-80+ in. (50-200+ cm) that are poorly to very poorly drained.
 - o Surface layer of soil contains a high organic matter content.
 - o None to Slightly effervescent throughout top 20" (50 cm) of mineral soil surface
 - o Non-saline, sodic, or saline-sodic

Associated sites

R043BY330WY	Overflow (Ov) 15-19" Foothills and Mountains East Precipitation Zone Overflow
R043BY374WY	Subirrigated (Sb) 15-19" Foothills and Mountains East Precipitation Zone Subirrigated

Similar sites

R032XY378WY	Wetland (WL) 10-14" East Precipitation Zone Wetland 10-14" Foothills and Basins East P.Z., 032XY378WY has lower production.
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Table 1. Dominant plant species

Tree	Not specified
Shrub	(1) <i>Salix</i>
Herbaceous	(1) <i>Carex nebrascensis</i> (2) <i>Calamagrostis stricta ssp. inexpansa</i>

Legacy ID

R043BX678WY

Physiographic features

This site normally occurs in depressions or on level to nearly level bottomlands or adjacent to perennial streams or near springs, seeps and sloughs.

Table 2. Representative physiographic features

Landforms	(1) Foothills > Alluvial fan (2) Foothills > Stream terrace (3) Foothills > Drainageway
Runoff class	Negligible to medium
Flooding duration	Very brief (4 to 48 hours) to brief (2 to 7 days)
Flooding frequency	Occasional to frequent
Ponding duration	Brief (2 to 7 days) to very long (more than 30 days)
Ponding frequency	Frequent
Elevation	6,000–9,000 ft
Slope	0–6%
Ponding depth	0–12 in
Water table depth	0–18 in
Aspect	Aspect is not a significant factor

Climatic features

Annual precipitation and modeled relative effective annual precipitation ranges from 15 to 19 inches (381 – 483 mm). The normal precipitation pattern shows peaks in June tapering into September. This amounts to about 50% of the mean annual precipitation. Average snowfall is about 150 inches annually. Wide fluctuations may occur in yearly precipitation and result in more dry years than those with more than normal precipitation.

Because of the varied topography, the wind will vary considerably for different parts of the area. The wind is usually much lighter at the lower elevations and in the valleys as compared with the higher terrain. The average winter wind velocity is 8.5 mph while the summer wind velocity averages 7.5 mph. Winds during storms and on ridges may exceed 45 mph.

Temperatures show a wide range between summer and winter and between daily maximums and minimums, due to the high elevation and dry air, which permits rapid incoming and outgoing radiation. Cold air outbreaks from Canada in winter move rapidly from northwest to southeast and account for extreme minimum temperatures. Chinook winds may occur in winter and bring rapid rises in temperature. High winds are generally blocked by high mountains but occur in conjunction with thunderstorms, which are common in late summer. Growth of native cool-season plants begins about May 1 to May 15 and continues until about October 15.

For detailed information visit the Natural Resources Conservation Service National Water and Climate Center at <http://www.wcc.nrcs.usda.gov/>. Historically, "Crandall Creek" was the representative weather stations within this subset. However, "Sunshine 3NE" is the only available weather station within a close proximity in location and characteristics for this subset. The following graphs and charts are a collective sample representing the averaged normals and 30-year annual rainfall data for the selected weather stations from 1981 to 2010.

Table 3. Representative climatic features

Frost-free period (characteristic range)	40 days
Freeze-free period (characteristic range)	84 days
Precipitation total (characteristic range)	14 in
Frost-free period (actual range)	40 days

Freeze-free period (actual range)	84 days
Precipitation total (actual range)	14 in
Frost-free period (average)	40 days
Freeze-free period (average)	84 days
Precipitation total (average)	14 in

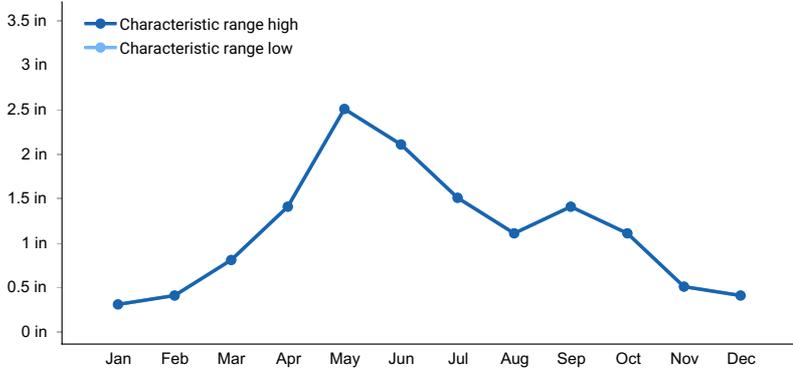


Figure 1. Monthly precipitation range

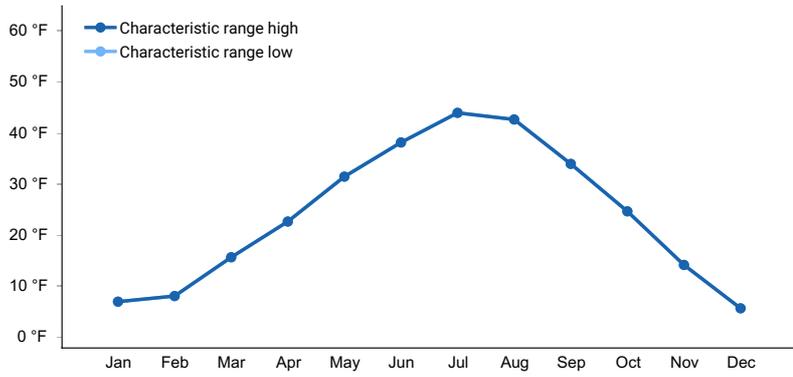


Figure 2. Monthly minimum temperature range

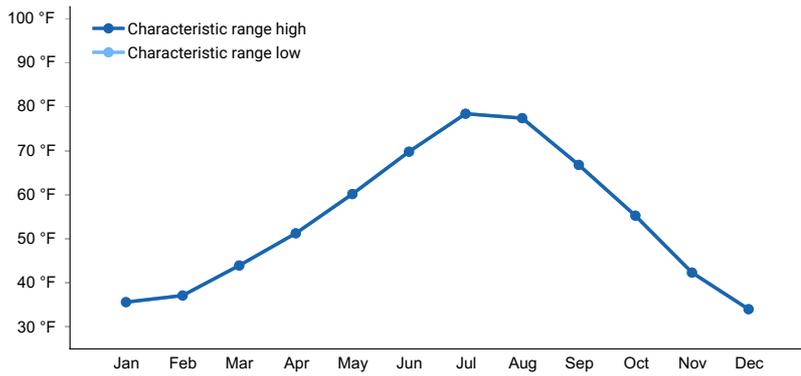


Figure 3. Monthly maximum temperature range

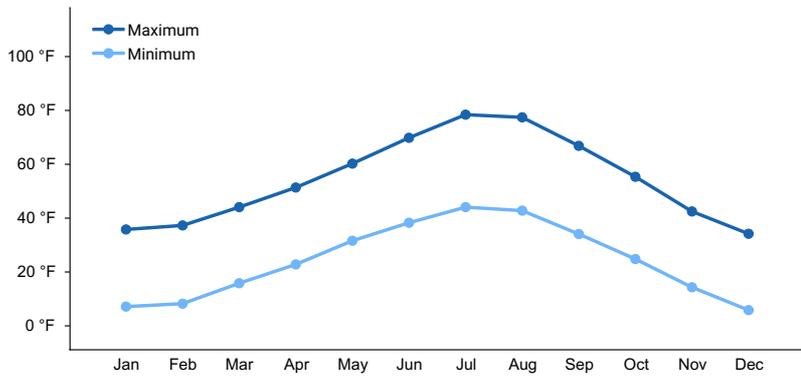


Figure 4. Monthly average minimum and maximum temperature

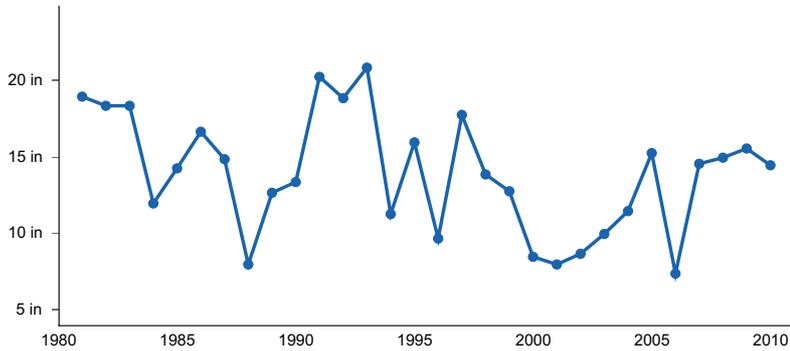


Figure 5. Annual precipitation pattern

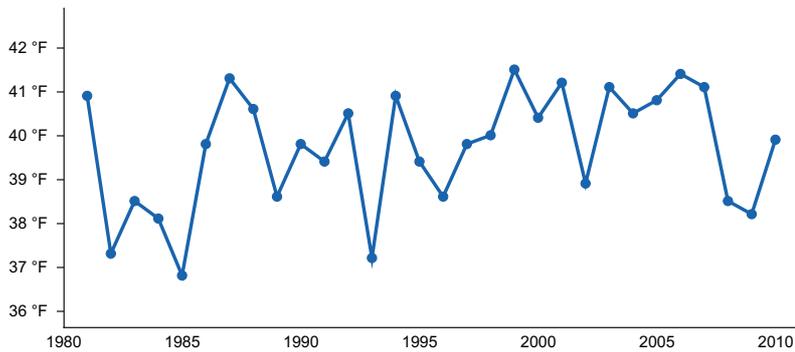


Figure 6. Annual average temperature pattern

Climate stations used

- (1) SUNSHINE 3NE [USC00488758], Meeteetse, WY

Influencing water features

The characteristics of these soils have influence from ground water (water table above 12 inches (30 cm)) and water will be above the soil surface for part but not all of the growing season. These soils are moderately deep to deep and poorly to very poorly drained.

Wetland description

System: Palustrine
 Subsystem: None
 Class: Emergent Wetland
 Sub-class: Persistent

Stream type: C (Rosgen)

Soil features

This site consists of deep to very deep poorly drained soils formed in alluvium with a water table above the surface for part but not all of the growing season. They are on nearly level to slightly depressed areas with poor surface drainage. In some places, the surface layers have high organic matter content. The soil characteristics having the most influence on the plant community are depth to a water table at or near the surface for all of the growing season and high organic content.

Table 4. Representative soil features

Parent material	(1) Alluvium–sandstone and shale
Surface texture	(1) Mucky clay (2) Clay loam (3) Loam (4) Silty clay loam (5) Silt loam (6) Silty clay
Family particle size	(1) Fine-loamy (2) Fine
Drainage class	Poorly drained
Permeability class	Slow to moderate
Soil depth	20–60 in
Available water capacity (0-40in)	2.2–6.6 in
Calcium carbonate equivalent (0-40in)	0–15%
Electrical conductivity (0-40in)	0–4 mmhos/cm
Sodium adsorption ratio (0-40in)	0–5
Soil reaction (1:1 water) (0-40in)	6.6–8.4

Ecological dynamics

Potential vegetation on this site is dominated by plants that can tolerate soils which have a water table above the surface for part of the growing season. Significant vegetation includes mid grass-like species, tall and mid cool season grasses, and a variety of riparian shrubs and forbs. The expected potential composition for this site is about 70% grasses, 15% forbs and 15% woody plants. The composition and production will vary naturally due to historical use, fluctuating precipitation and fire frequency.

As this site deteriorates species such as low-growing sedges, Baltic rush and willows increase. Grasses and grass-like species such as Nebraska sedge, northern reedgrass, and tufted hairgrass will decrease in frequency and production. As the site further deteriorates annual grasses such as foxtail barley and forbs increase and will become dominant.

Beaver can play a critical role in the maintenance or development of this site. By modifying the water level through dams, the water table can be significantly increased and diverted water can replenish off channel areas such as oxbows. Modifying water levels also promotes the establishment of wetland species or control emergent vegetation, which can become overabundant. Removal of beaver in areas has resulted in lowering of the water tables and channelization of waterways. Recently, reintroducing beaver to areas to stabilize riparian areas and create wetlands has gained popularity.

The Historic Climax Plant Community (description follows the plant community diagram) has been determined by study of rangeland relic areas, or areas protected from excessive disturbance. Trends in plant communities going from heavily grazed areas to lightly grazed areas, seasonal use pastures, and historical accounts have also been

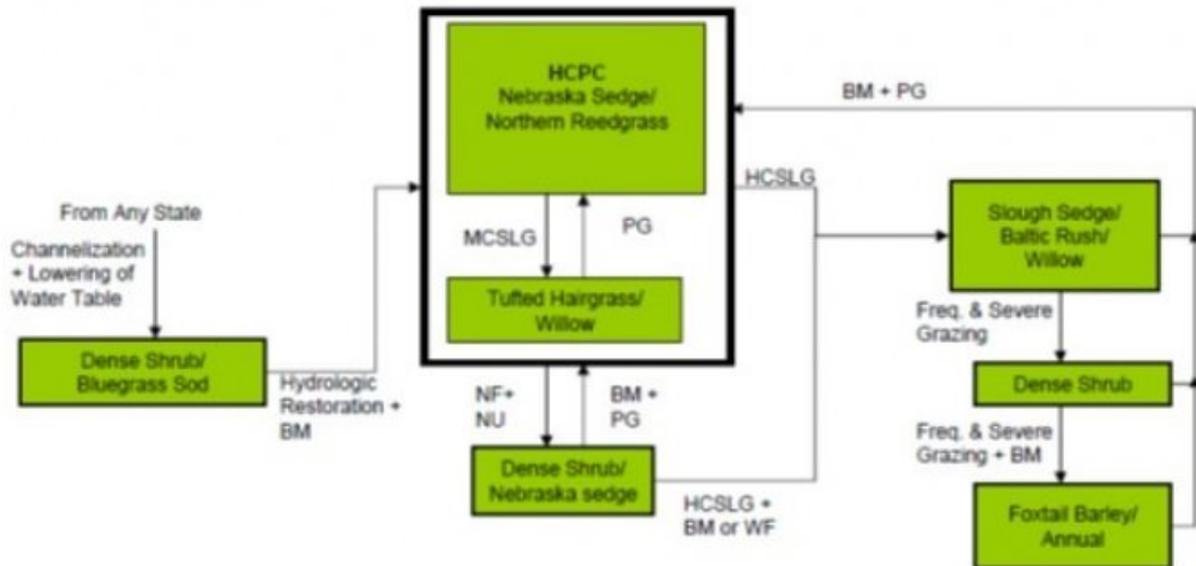
used.

The following is a State and Transition Model Diagram that illustrates the common plant communities (states) that can occur on the site and the transitions between these communities. The ecological processes will be discussed in more detail in the plant community narratives following the diagram.

State and transition model

Site Type: Rangeland
MLRA: 43BY – Central Rocky Mountains

Wetland (WL) 15"-19" East P.Z.
R043BY378WY



BM – Brush Management (fire, chemical, mechanical)
Freq. & Severe Grazing – Frequent and Severe Utilization of the Cool-season Mid-grasses during the Growing Season
GLMT – Grazing Land Mechanical Treatment
LTPG – Long-term Prescribed Grazing
MCSLG – Moderate, Continuous Season-long Grazing
HCSLG – Heavy, Continuous Season-long Grazing
NU, NF – No Use and No Fire
PG – Prescribed Grazing (proper stocking rates with adequate recovery periods during the growing season)
VLTPG – Very Long-term Prescribed Grazing (could possibly take generations)
Na – Moderate Sodium in Soil
WF - Wildfire

State 1 Nebraska Sedge/Northern Reedgrass Plant Community

Community 1.1 Nebraska Sedge/Northern Reedgrass Plant Community

The interpretive plant community for this site is the Historic Climax Plant Community. This state evolved with grazing by large herbivores and a perched water table and periodic wildfires. Potential vegetation is about 70% grasses or grass-like plants, 15% forbs, and 15% woody plants. The major grasses and grasslikes include Nebraska sedge, northern reedgrass, tufted hairgrass, slough sedge, and watersedge. The main woody plant is willows, but bog kalmia, bog birch, currant and dogwood also occur. A variety of forbs occur in this state and plant diversity is high (see Plant Composition Table). This state produces between 4500 and 6500 pounds annually, depending on the growing conditions. The state is extremely resilient and well adapted to the Northern Great Plains climatic conditions. The diversity in plant species allow for high drought resistance. This is a healthy and sustainable plant community (site/soil stability, watershed function, and biologic integrity). Transitions or pathways leading to other plant communities are as follows:

- Moderate, continuous season-long grazing will convert this plant community to the Tufted Hairgrass/Willow Plant Community.
- Heavy, continuous, season-long grazing will convert this plant community to Slough Sedge/Baltic Rush/Willow Vegetation State.
- No fire and No Use will convert the HCPC to the Dense Shrub/Nebraska Sedge Plant community.
- Channelization and lowering of the Water Table will

result in a Dense Shrub/Bluegrass Sod Plant community.

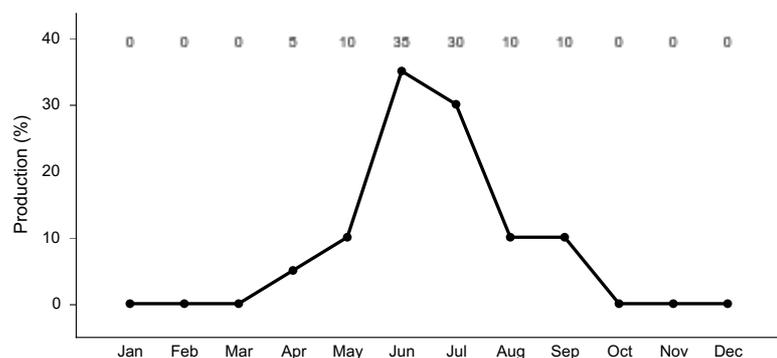


Figure 8. Plant community growth curve (percent production by month).
WY0603, 15-19E Free water sites - WL, Sb. SS.

State 2 Tufted Hairgrass/Willow Plant Community

Community 2.1 Tufted Hairgrass/Willow Plant Community

Historically, this plant community evolved under grazing by large ungulates, a water table within reach of the herbaceous plants through most of the growing season, and a low fire frequency. Currently, this site is normally found under a moderate, season-long grazing regime and will be exacerbated by prolonged drought conditions. In addition, the fire regime for this site has been modified and extended periods without fire is now common. Willows are an important component of this plant community. Cool-season grasses and grasslikes make up the majority of the understory with the balance made up of miscellaneous forbs. Mid grasslike species and cool season tall and mid-grasses dominate this state. The major grasslikes and grasses include, slough sedge, watersedge, and of less frequency Northern reedgrass, tufted hairgrass, and Nebraska sedge. Grasses and grasslikes of secondary importance include, Baltic rush, low growing sedges, rushes, and tall mannagrass. Forbs, commonly found in this plant community, include American bistort, mint, alpine avens, arrowgrass, horsetail, iris, marsh marigold, and water hemlock. Willows and other riparian shrubs comprise from 20% to 25% of the total annual production. When compared to the Historical Climax Plant Community, willows and other riparian shrubs, low growing sedges, and rushes have increased. Northern reedgrass, tufted hairgrass, and Nebraska sedge have decreased, often occurring only where protected from grazing by the shrub canopy. Some annual forbs and grasses such as foxtail barley may have invaded the site but are in small patches. This state produces between 4300 and 6200 pounds annually, depending on the growing conditions. This plant community is resistant to change. The herbaceous species present are well adapted to grazing; however, species composition can be altered through long-term overgrazing. The herbaceous component is mostly intact and plant vigor and replacement capabilities are sufficient. Water flow patterns and litter movement may be occurring but only on steeper slopes. Incidence of pedestalling is minimal. Soils are mostly stable and the surface shows minimum soil loss. The watershed is functioning and the biotic community is intact. Transitions or pathways leading to other plant communities are as follows:

- Prescribed grazing over the long-term will result in a plant community very similar to the Historic Climax Plant Community.
- Heavy, continuous, season-long grazing will convert this plant community to Slough Sedge/Baltic Rush/Willow Vegetation State.
- No fire and No Use will convert the HCPC to the Dense Shrub/Nebraska Sedge Plant Community.
- Channelization and lowering of the Water Table will result in a Dense Shrub/Bluegrass Sod Plant community.

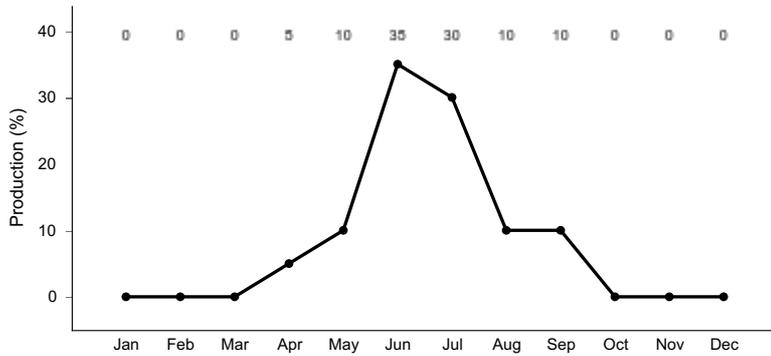


Figure 9. Plant community growth curve (percent production by month). WY0603, 15-19E Free water sites - WL, Sb. SS.

State 3 Dense Shrub/Nebraska Sedge Plant Community

Community 3.1 Dense Shrub/Nebraska Sedge Plant Community

This plant community results from little or no use and no fires over an extended period in the HCPC. Shrubs are significant component of this plant community. Mid grasslikes and tall and mid cool-season grasses make up the majority of the understory, however, the shrub component has become so dominant that the area occupied by herbaceous species has been significantly reduced. Preferred grasses are still present but the frequency and production have been reduced. Dominant grasslikes and grasses include Nebraska sedge, tufted hairgrass, northern reedgrass, basin wildrye, and alpine timothy. Grasses and grasslikes of secondary importance include inland sedge, meadow barley, Baltic rush, big bluegrass, and Idaho fescue. Forbs, commonly found in this plant community, include American bistort, mint, alpine avens, arrowgrass, horsetail, iris, marsh marigold, and water hemlock. A wide variety of shrubs can be present and will exceed 30% of the total production. Shrubs include mainly willows as well as others such as dogwood, chokecherry, currant, wild rose, water birch, thinleaf alder, and boxelder. When compared to the Historic Climax Plant Community, shrubs have significantly increased. Most of the preferred grasses and grasslikes are present in areas not dominated by shrubs. The increase in shrub production has offset some of the loss in the herbaceous production. Annual production ranges from 4000 to 6000 pounds. This plant community is resistant to change as the shrubs become more abundant. The herbaceous component is as diverse and plant vigor and species regeneration capabilities of preferred species are sufficient. Some plants may becoming overly mature especially some of the shrubs. Browsing may increase the opening for the preferred herbaceous plants, however, over grazing is possible if prescribed grazing is not implemented. Water flow patterns and litter movement is normal. Incidence of pedestalling is not occurring. Soils are stable and the surface shows minimum or no soil loss. The watershed is functioning and the biotic community is intact. Transitions or pathways leading to other plant communities are as follows: • Prescribed grazing and wildfire or brush management will convert this plant community to the HCPC. The probability of this occurring is high especially brush management is used with rotational grazing along with deferred grazing as part of prescribed method of use. In addition, the removal of fire suppression will allow a somewhat natural fire regime to reoccur to more easily transition between this plant community and the HCPC. • Brush management or Wildfire with Frequent and severe grazing will convert this plant community to the Slough Sedge/Baltic Rush/Willow Vegetation State. • Channelization and lowering of the Water Table will result in a Dense Shrub/Bluegrass Sod Plant community.

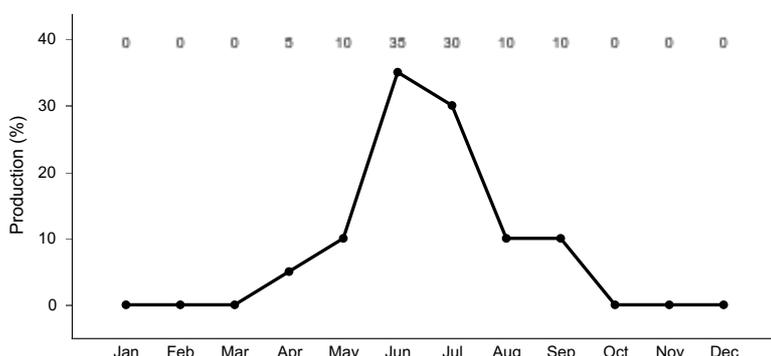


Figure 10. Plant community growth curve (percent production by month).
WY0603, 15-19E Free water sites - WL, Sb. SS.

State 4 Slough Sedge/Baltic Rush/Willow Plant Community

Community 4.1 Slough Sedge/Baltic Rush/Willow Plant Community

This vegetation state currently is found under a heavy continuous season-long grazing by livestock. Shrubs are significant component of this plant community. Sedges and rushes make up the majority of the understory, but some of the preferred grasses and grasslikes have been reduced or absent. Dominant grasslikes and grasses include slough sedge, water sedge, tall mannagrass, and Baltic rush. Grasses and grasslikes of less frequency are Nebraska sedge, tufted hairgrass, and northern reedgrass. Forbs, commonly found in this plant community, include American bistort, mint, alpine avens, arrowgrass, horsetail, iris, marsh marigold, and water hemlock. Other weedy species such as cocklebur, sowistle, prickly lettuce, curly dock, common milkweed, stickseed, and a variety of thistles may have increased. A wide variety of shrubs can be present and will exceed 20% of the total production. Shrubs include mainly willows as well as others such as dogwood, chokecherry, currant, wild rose, water birch, thinleaf alder, and boxelder. When compared to the Historic Climax Plant Community, shrubs, bluegrasses, low sedges, and mat muhly have increased. Most of the preferred grasses and grasslikes have been reduced or removed. The increase in shrub production has offset some of the loss in the herbaceous production. Annual production ranges from 3500 to 5200 pounds. This plant community is resistant to change as the shrubs become more abundant. The herbaceous component is not as diverse and plant vigor and species regeneration capabilities of some cool-season perennials and mid sedges are deficient. The removal of grazing does not seem to affect the plant composition or structure of the plant community. Soil erosion may be accelerating because of increased bare ground although areas where sod forming plants are more dominant water infiltration has decreased. While these patches of sod, protects the area itself, off-site areas are affected by excessive runoff that can cause rills and gully erosion. Water flow patterns are obvious in the bare ground areas. Pedestalling and hummocks are more noticeable. Rill channels may be noticeable in the interspaces on steeper areas and gullies may be establishing where rills have concentrated down slope. Transitions or pathways leading to other plant communities are as follows:

- Prescribed grazing plus brush management will convert this plant community to near HCPC. If prescribed fire is used as a means to reduce or remove the shrubs, sufficient fine fuels will need to be present. This may require deferment from grazing prior to treatment. Post management is critical to ensure success. This can range from two or more years of rest to partial growing season deferment, depending on the condition of the understory at the time of treatment and the growing conditions following treatment. Seeding and usually chiseling will be required regardless of the brush treatment to reestablish the major cool-season grasses, breakup the sodded areas, and decrease soil the compaction.
- Frequent and severe grazing will convert this plant community to the Dense Shrub Plant Community.
- Channelization and lowering of the Water Table will result in a Dense Shrub/Bluegrass Sod Plant community.

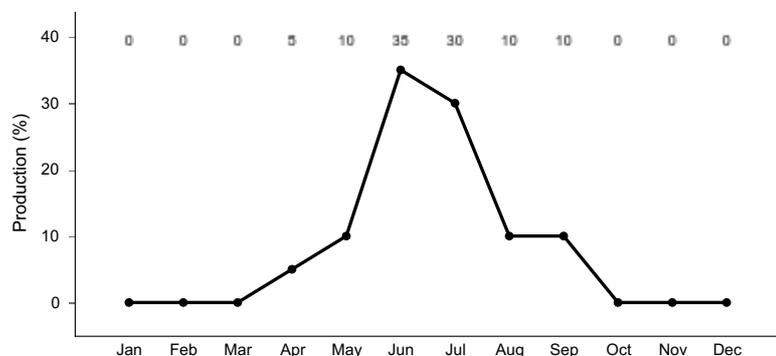


Figure 11. Plant community growth curve (percent production by month).
WY0603, 15-19E Free water sites - WL, Sb. SS.

State 5 Dense Shrub Plant Community

Community 5.1 Dense Shrub Plant Community

This plant community is the result of frequent and severe grazing and protection from fire. Shrubs dominate this plant community as the annual production will exceed 30%. The preferred cool season grasses and grasslikes have been eliminated or greatly reduced. Low growing sedges and rushes can dominate the interspaces between shrubs. Grasses and grasslikes include Rocky Mountain sedge, small wing sedge, Hoary sedge, spikerush, bulrush, Drummond's rush, and foxtail barley. Weedy species such cocklebur, sowhistle, prickly lettuce, curly dock, common milkweed, stickseed, and a variety of thistles can occupy the site. When compared with the HCPC, the annual production is less as the major grasslikes and grasses are reduced and replaced by lower growing sedges, rushes and bulrushes. The shrub composition has changed as willows have either been removed or significantly altered and replaced with bog kalmia and laurel, water birch, and other less preferred species. In general, total production by shrubs have increased, which compensates for some of the decline in the herbaceous production. Annual production ranges from 3200 to 4800 pounds. This plant community is resistant to change as the stand becomes more decadent and the sodded areas, which are extremely resistant to change, expand. Continued frequent and severe grazing or the removal of grazing does not seem to affect the plant composition or structure of the plant community. The herbaceous component is not as diverse and plant vigor and species regeneration capabilities of cool-season perennials are deficient. Soil erosion may be accelerating because of increased bare ground. Although areas were sod forming plant become more dominate water infiltration has decreased. While these patches of sod, protects the area itself, off-site areas are affected by excessive runoff that can cause rills and gully erosion. Water flow patterns are obvious in the bare ground areas. Pedestalling and hummocks are more noticeable. Rill channels may be noticeable in the interspaces on steeper areas and gullies may be establishing where rills have concentrated down slope. Transitions or pathways leading to other plant communities are as follows: • Prescribed grazing plus either grazing land mechanical treatment (chiseling and seeding etc) or brush management will convert this plant community to near HCPC. If prescribed fire is used as a means to reduce or remove the shrubs, sufficient fine fuels will need to be present. This may require deferment from grazing prior to treatment. Post management is critical to ensure success. This can range from two or more years of rest to partial growing season deferment, depending on the condition of the understory at the time of treatment and the growing conditions following treatment. Seeding and usually chiseling will be required regardless of the brush treatment to reestablish the major cool-season grasses, breakup the sodded areas, and decrease soil the compaction. • Frequent and severe grazing will convert this plant community to the Foxtail Barley/Annuals Plant Community. • Channelization and lowering of the Water Table will result in a Dense Shrub/Bluegrass Sod Plant community.

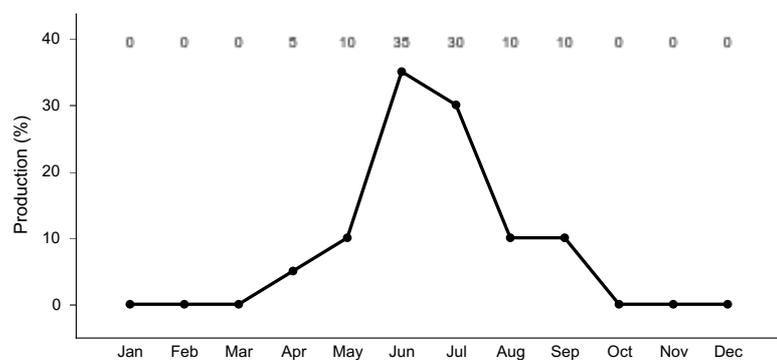


Figure 12. Plant community growth curve (percent production by month).
WY0603, 15-19E Free water sites - WL, Sb. SS.

State 6 Foxtail barley/Annual Plant Community

Community 6.1 Foxtail barley/Annual Plant Community

This plant community evolved under frequent and severe heavy yearlong grazing and the shrub components have been removed by heavy browsing, wildfire or human means or any combination of these impacts. Foxtail barley, weedy annuals, and some low growing sedge, rushes, and spikerushes are the most dominate plants and occupy any open bare ground area. Some shrubs may still be present but occur in patches. Compared to the HCPC, weedy annual species, low growing sedge, rushes, spikerushes, and foxtail barley are widespread and virtually all of the major grasses and grasslikes are absent or severely decreased. Most shrubs have been removed. Weedy species such cocklebur, sowhistle, prickly lettuce, curly dock, common milkweed, stickseed, and a variety of thistles can occupy the site. . Noxious weeds such as leafy spurge, Canada thistle, and white top will likely have invaded the

site, if a seed source is available. Bare ground may be more prevalent if it is not infested with annuals. Annual production ranges from 1500 to 2400 pounds. This plant community is resistant to change as these herbaceous species are extremely resistant to grazing. Continued frequent and severe grazing or the removal of grazing does not seem to affect the plant composition or structure of the plant community. The function and structure of this plant community is severely compromised. Diverse and plant vigor and species regeneration capabilities of the preferred grasses and grasslikes are deficient. Soil erosion is accelerating because of increased bare ground and cover of annual species. Water flow patterns are obvious in the bare ground areas and pedestalling and hummocks are apparent. In general, infiltration is reduced and runoff is increased as the soils becomes more compacted. Rill channels are noticeable in the interspaces and gullies are typical where rills have concentrated down slope. Transitions or pathways leading to other plant communities are as follows: • Prescribed grazing plus either grazing land mechanical treatment (chiseling and seeding etc) or brush management will convert this plant community to near HCPC. If prescribed fire is used as a means to reduce or remove the shrubs, sufficient fine fuels will need to be present. This may require deferment from grazing prior to treatment. Post management is critical to ensure success. This can range from two or more years of rest to partial growing season deferment, depending on the condition of the understory at the time of treatment and the growing conditions following treatment. Seeding and usually chiseling will be required regardless of the brush treatment to reestablish the major cool-season grasses, breakup the sodded areas, and decrease soil the compaction.

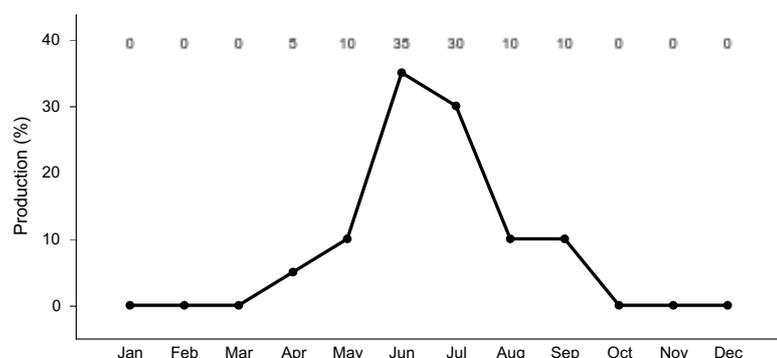


Figure 13. Plant community growth curve (percent production by month). WY0603, 15-19E Free water sites - WL, Sb. SS.

State 7 Dense Shrub/Bluegrass Sod/ Plant Community

Community 7.1 Dense Shrub/Bluegrass Sod/ Plant Community

This plant community evolved as a result of channelization or down cutting of an adjacent water source. The disruption in the natural hydrologic regime is either directly caused by human, such as dams or dikes, or indirectly through accelerated erosion and channelization. Extended periods of drought will exacerbate this situation. Upland plants are more pronounced and Deep-rooted shrub species, which can benefit from the deeper water table, dominate. Big and/or silver sagebrush and/or rubber rabbitbrush occur on drier warmer sites and a mixture of sagebrush and isolated patches of riparian species occur on cooler wetter sites. Tall and medium cool season grasses and grasslikes such as mid sedges have been reduced or eliminated. Dense sod patches of grasses mostly Kentucky bluegrass occur amongst the shrubs and bare ground. The annual grasses and more upland forbs are prevalent along with noxious weeds such as leafy spurge, Canadian thistle and Russian Knapweed. Total annual production is mostly from shrubs and sod forming grasses. Shrubs can be greater than 40% of the total annual production. When compared with the HCPC, the annual production is significantly reduced but the dense shrub component makes up for some of this loss in total production. Annual production ranges from 750 to 1500 pounds. This plant community is resistant to change as the shrub stand and the sod becomes denser. Continued frequent and severe grazing or the removal of grazing does not seem to affect the plant composition or structure of the plant community. Warm-season grasses, weedy species and bare ground compromise the biotic integrity. Plant diversity is poor and the potential for preferred species to reproduce is absent. The shift in the vegetative structure and function is extreme and the biotic integrity is lost. The hydrologic integrity of the site has been severely altered as the water table is now below the root deep of the herbaceous species. The soil of this state is somewhat protected where the sod patches are located and the dense shrubs occur, but erosion has accelerated in places between the patches where bare ground may be common. Water flow patterns and pedestalling are obvious and may be

numerous. Remnant hummocks may be present. Infiltration is reduced and runoff is increased. Rill channels are noticeable in the interspaces and gullies and head cuts typical. Transitions or pathways leading to other plant communities are as follows: • Hydrologic restoration, grazing land mechanical treatment, and brush management, will convert this plant community in to the HCPC. Restoring the hydrological function of an area is usually very expensive and may take many years. This may require reintroducing both periodic flooding and an overflow regime. If practical and if the habitat is favorable, reintroducing beaver may be a solution. In addition, implementing grazing land mechanical treatments, such as chiseling and reseeding with native species is usually a necessity to accelerate recovery where few desirable plants remain. Brush management typically is necessary to remove shrubs and specifically upland shrubs if they have encroached.

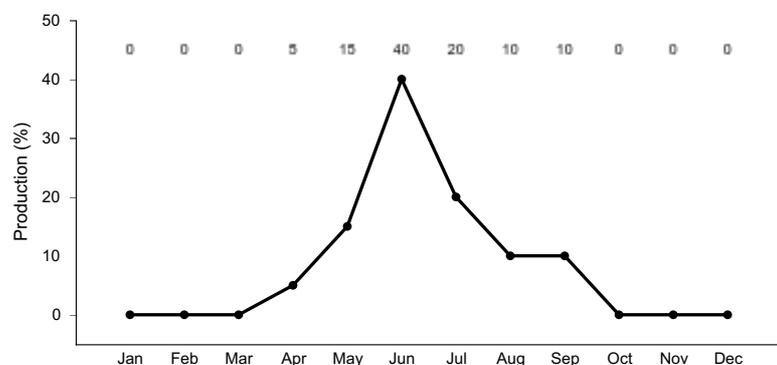


Figure 14. Plant community growth curve (percent production by month). WY0601, 15-19E all upland sites.

Additional community tables

Table 5. Community 1.1 plant community composition

Group	Common Name	Symbol	Scientific Name	Annual Production (Lb/Acre)	Foliar Cover (%)
Grass/Grasslike					
1				825–1375	
	Nebraska sedge	CANE2	<i>Carex nebrascensis</i>	825–1375	–
2				825–1375	
	northern reedgrass	CASTI3	<i>Calamagrostis stricta ssp. inexpansa</i>	825–1375	–
3				550–1375	
	tufted hairgrass	DECE	<i>Deschampsia cespitosa</i>	550–1375	–
4				0–550	
	slough sedge	CAOB3	<i>Carex obnupta</i>	0–550	–
5				0–550	
	water sedge	CAAQ	<i>Carex aquatilis</i>	0–550	–
6				0–275	
	Grass, perennial	2GP	<i>Grass, perennial</i>	0–275	–
	Macoun's reedgrass	CACAM	<i>Calamagrostis canadensis var. macouniana</i>	0–275	–
	dunhead sedge	CAPH2	<i>Carex phaeocephala</i>	0–275	–
	sedge	CAREX	<i>Carex</i>	0–275	–
	rush	JUNCU	<i>Juncus</i>	0–275	–
Forb					
7				0–825	
	Forb, perennial	2FP	<i>Forb, perennial</i>	0–275	–
	monkshood	ACONI	<i>Aconitum</i>	0–275	–
	pale agoseris	AGGL	<i>Agoseris glauca</i>	0–275	–

	white marsh marigold	CALE4	<i>Caltha leptosepala</i>	0–275	–
	water hemlock	CICUT	<i>Cicuta</i>	0–275	–
	horsetail	EQUIS	<i>Equisetum</i>	0–275	–
	geranium	GERAN	<i>Geranium</i>	0–275	–
	iris	IRIS	<i>Iris</i>	0–275	–
	wild mint	MEAR4	<i>Mentha arvensis</i>	0–275	–
	tall fringed bluebells	MECI3	<i>Mertensia ciliata</i>	0–275	–
	American bistort	POBI6	<i>Polygonum bistortoides</i>	0–275	–
	cinquefoil	POTEN	<i>Potentilla</i>	0–275	–
	blue-eyed grass	SISYR	<i>Sisyrinchium</i>	0–275	–
	marsh hedgenettle	STPA	<i>Stachys palustris</i>	0–275	–
	groundsel	TEPHR3	<i>Tephrosia</i>	0–275	–
	arrowgrass	TRIGL	<i>Triglochin</i>	0–275	–
Shrub/Vine					
8				0–550	
	willow	SALIX	<i>Salix</i>	0–550	–
9				0–550	
	Shrub (>.5m)	2SHRUB	<i>Shrub (>.5m)</i>	0–275	–
	bog birch	BEP4	<i>Betula pumila</i>	0–275	–
	redosier dogwood	COSE16	<i>Cornus sericea</i>	0–275	–
	alpine laurel	KAMI	<i>Kalmia microphylla</i>	0–275	–
	currant	RIBES	<i>Ribes</i>	0–275	–

Animal community

Animal Community – Wildlife Interpretations

Nebraska Sedge/Tufted Hairgrass Plant Community (HCPC): The predominance of grasses and grasslikes in this plant community favors grazers and mixed-feeders, such as deer, moose, bison, elk, and antelope. Suitable thermal and escape cover for these species may be limited due to the low quantities of woody plants. These sites are also important corridors within the foot slopes of mountains and between valuable water sources for many wildlife species. When found adjacent to sagebrush dominated states, this plant community may provide brood rearing/foraging areas for sage grouse, as well as lek sites. Other birds that would frequent this plant community include Other birds that would frequent this plant community include nesting species, blue grouse, American kestrel, hawks, and golden eagle.. As these sites are adjacent to water, bald Eagles, Wilson’s phalarope, sandhill crane, great blue heron, waterfowl, and kingfishers can be found frequenting the site. Many small mammals occur included water species such as muskrat, beaver and river otter.

Tufted Hairgrass/Willow Plant Community: The combination of an overstory of shrubs and an understory of grasses, grasslikes, and forbs provides a very diverse plant community for wildlife. The shrubs tend to break up hard crusted snow and many of these provide important sources of food for many wildlife species. Consequently, many large mammals use this state for foraging and cover year-round. These sites are also important corridors within the foot slopes of mountains and between upland sites and valuable water sources for many wildlife species. It provides important winter habitat for sage grouse. Other birds that would frequent this plant community include Other birds that would frequent this plant community include nesting species, blue grouse, American kestrel, hawks, and golden eagle.. As these sites are adjacent to water, bald Eagles, Wilson’s phalarope, sandhill crane, great blue heron, waterfowl, and kingfishers can be found frequenting the site. Many small mammals occur included water species such as muskrat, beaver and river otter.

Dense Shrub/Nebraska Sedge Plant Community: The combination of an overstory of shrubs and an understory of grasses and forbs provides a very diverse plant community for wildlife. The shrubs tend to break up hard crusted snow and many of these provide important sources of food for many wildlife species. Consequently, many large mammals use this state for foraging and cover year-round. These sites are also important corridors within the foot slopes of mountains and between upland sites and valuable water sources. It provides important winter foraging habitat for sage grouse. Other birds that would frequent this plant community include nesting species, blue grouse, American kestrel, hawks, and golden eagle.. As these sites are adjacent to water, bald Eagles, Wilson's phalarope, sandhill crane, great blue heron, waterfowl, and kingfishers can be found frequenting the site. Many small mammals occur included water species such as muskrat, beaver and river otter.

Slough Sedge/Baltic Rush/ Willows Plant Community: The combination of an overstory of shrubs and an understory of grasses and forbs provides a very diverse plant community for wildlife. The shrubs tend to break up hard crusted snow and many of these provide important sources of food for many wildlife species. Consequently, many large mammals use this state for foraging and cover year-round. These sites are also important corridors within the foot slopes of mountains and between upland sites and valuable water sources. It provides important foraging habitat for sage grouse. Other birds that would frequent this plant community include nesting species, blue grouse, American kestrel, hawks, and golden eagle.. As these sites are adjacent to water, bald Eagles, Wilson's phalarope, sandhill crane, great blue heron, and waterfowl can be found frequenting the site. Many small mammals occur included water species such as muskrat, beaver and river otter.

Dense Shrub Plant Community: The increase in the overstory of shrubs provides for increase in year round cover and browsing selections for wildlife. The shrubs tend to break up hard crusted snow and many of these provide important sources of food for many wildlife species. However, due to the lack of herbaceous production and diversity of mid cool season grasses and grasslikes, this site is less beneficial to grazers. These sites are important corridors within the foot slopes of mountains and between upland sites and valuable water sources for many wildlife species. It provides important winter, nesting, brood-rearing, and foraging habitat for sage grouse. Other birds that would frequent this plant community include nesting species, blue grouse, American kestrel, hawks, and golden eagle. As these sites are adjacent to water, bald Eagles, Wilson's phalarope, sandhill crane, great blue heron, waterfowl, and kingfishers can be found frequenting the site. Many small mammals occur included water species such as muskrat, beaver and river otter.

Foxtail Barley/Annual Plant Community: The lack of tall or mid growing shrubs does not provides cover for many species. As these areas tend to greens-up sooner in the spring, these sites provide early new growth for foraging large and small mammals. Generally, these are not target plant communities for wildlife habitat management.

Dense Shrub/Bluegrass Sod Plant Community: The increase in the overstory of shrubs provides for increase in year round cover and browsing selections for wildlife. The shrubs tend to break up hard crusted snow and many of these provide important sources of food for many wildlife species. However, due to the lack of herbaceous production and diversity of mid cool season grasses and grasslikes, this site is less beneficial to grazers. These sites are important corridors within the foot slopes of mountains and between upland sites and valuable water sources for many wildlife species. It provides important winter, nesting, brood-rearing, and foraging habitat for sage grouse. However, as the hydrology of the area has been significantly altered less water dependent species frequent the site. In addition, with the shift to more upland plants more upland species may be present.

Animal Community – Grazing Interpretations

The following table lists suggested stocking rates for cattle under continuous season-long grazing under normal growing conditions. These are conservative estimates that should be used only as guidelines in the initial stages of the conservation planning process. Often, the current plant composition does not entirely match any particular plant community (as described in this ecological site description). Because of this, a field visit is recommended, in all cases, to document plant composition and production. More precise carrying capacity estimates should eventually be calculated using this information along with animal preference data, particularly when grazers other than cattle are involved. Under more intensive grazing management, improved harvest efficiencies can result in an increased carrying capacity. If distribution problems occur, stocking rates must be reduced to maintain plant health and vigor.

Plant Community Production Carrying Capacity*
(Lb./ac) (AUM/ac)

Nebraska Sedge/Northern Reedgrass 4500-6500 3.0
Tufted Hairgrass/Willow 4300-6200 2.5
Dense Shrub/Nebraska Sedge 4000-6000 2.0
Slough Sedge/Baltic Rush/Willow 3500-5200 1.5
Dense Shrub 3200-4800 1.0
Foxtail Barley/Annual 2500-3200 1.0
Dense Shrub/Bluegrass Sod 750-1500 0.8

* - Continuous, season-long grazing by cattle under average growing conditions.

Grazing by domestic livestock is one of the major income-producing industries in the area. Rangeland in this area may provide yearlong forage for cattle, sheep, or horses. During the dormant period, the forage for livestock use needs to be supplemented with protein because the quality does not meet minimum livestock requirements.

Hydrological functions

Climate is the principal factor limiting forage production on this site. This site is dominated by soils in hydrologic group D. Infiltration and runoff potential for this site varies from moderate to high depending on soil hydrologic group and water table. Runoff will be high on this site since the soil are saturated. (Refer to Part 630, NRCS National Engineering Handbook for detailed hydraulic information.

Rills and gullies should not typically be present. Water flow patterns should be barely distinguishable if at all present. Litter typically falls in place, and signs of movement are not common. Chemical and physical crusts are rare to non-existent. Cryptogamic crusts are present, but only cover 1-2% of the soil surface.

Recreational uses

This site provides hunting opportunities for upland game and water species. Sites adjacent to perennial stream provide opportunities for fishing and water activities. The wide varieties of plants that bloom from spring until fall have an esthetic value that appeals to visitors. Other recreational uses may included hiking, camping, mountain biking, and in the winter snowshoeing and cross-country skiing.

Wood products

No appreciable wood products are present on the site.

Other products

None noted.

Inventory data references

Information presented here has been derived from NRCS clipping data and other inventory data. Field observations from range trained personnel was also used. Those involved in developing this site include: Chris Krassin, Range Management Specialist, James Haverkamp, Range Management Specialist, Steven Gullion, Range Management Specialist, James Mischke, District Conservationist, and Everet Bainter, State Range Management Specialist. Other sources used as references include USDA NRCS Water and Climate Center, USDA NRCS National Range and Pasture Handbook, and USDA NRCS Soil Surveys from various counties.

Contributors

J. Haverkamp

Approval

Scott Woodall, 10/04/2019

Rangeland health reference sheet

Interpreting Indicators of Rangeland Health is a qualitative assessment protocol used to determine ecosystem condition based on benchmark characteristics described in the Reference Sheet. A suite of 17 (or more) indicators are typically considered in an assessment. The ecological site(s) representative of an assessment location must be known prior to applying the protocol and must be verified based on soils and climate. Current plant community cannot be used to identify the ecological site.

Author(s)/participant(s)	Ray Gullion, E. Bainter
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Date	05/01/2008
Approved by	E. Bainter
Approval date	
Composition (Indicators 10 and 12) based on	Annual Production

Indicators

- 1. Number and extent of rills:** Rare to nonexistent.

- 2. Presence of water flow patterns:** Water flow patterns sometimes evident in floodplain zone where this site occurs.

- 3. Number and height of erosional pedestals or terracettes:** Rare to nonexistent.

- 4. Bare ground from Ecological Site Description or other studies (rock, litter, lichen, moss, plant canopy are not bare ground):** Bare ground is typically less than 1%.

- 5. Number of gullies and erosion associated with gullies:** Active gullies should not be present.

- 6. Extent of wind scoured, blowouts and/or depositional areas:** Minimal to nonexistent.

- 7. Amount of litter movement (describe size and distance expected to travel):** Herbaceous litter exhibits slight movement only associated with water flow patterns.

- 8. Soil surface (top few mm) resistance to erosion (stability values are averages - most sites will show a range of values):** Soil Stability Index ratings are typically 6.0

- 9. Soil surface structure and SOM content (include type of structure and A-horizon color and thickness):** Soil surface variable, typically an A-horizon up to 14 inches (35 cm) colors with a chroma of 2 or less and OM of 10-20%. Sometimes the A-horizon is overlain or replaced by an O-horizon of up to 30 inches (76 cm) with 40-60% OM.

-
10. **Effect of community phase composition (relative proportion of different functional groups) and spatial distribution on infiltration and runoff:** Plant community consists of 70-90% grasses, 10% forbs, and 0-20% shrubs. Dense plant canopy (>95%) and litter, despite slow to moderate infiltration rates, results in no runoff for this site. Basal cover is typically 20-30% for this site and effectively reduces runoff on this site as well.
-
11. **Presence and thickness of compaction layer (usually none; describe soil profile features which may be mistaken for compaction on this site):** No compaction layer exists.
-
12. **Functional/Structural Groups (list in order of descending dominance by above-ground annual-production or live foliar cover using symbols: >>, >, = to indicate much greater than, greater than, and equal to):**
- Dominant: mid-size, cool season bunchgrasses rhizomatous grass-like
- Sub-dominant: perennial forbs = perennial shrubs
- Other: cool season rhizomatous grasses
- Additional:
-
13. **Amount of plant mortality and decadence (include which functional groups are expected to show mortality or decadence):** Minimal decadence, typically associated with shrub component.
-
14. **Average percent litter cover (%) and depth (in):** Litter ranges from 0-5% of total canopy measurement with total litter (including beneath the plant canopy) from 90-100% expected. Herbaceous litter depth typically ranges from 20-35 mm. Woody litter can be up to a couple inches (4-6cm).
-
15. **Expected annual annual-production (this is TOTAL above-ground annual-production, not just forage annual-production):** English: 4500-6500 lb/ac (5500 lb/ac average); Metric: 5040 - 7280 kg/ha (6160 kg/ha average).
-
16. **Potential invasive (including noxious) species (native and non-native). List species which BOTH characterize degraded states and have the potential to become a dominant or co-dominant species on the ecological site if their future establishment and growth is not actively controlled by management interventions. Species that become dominant for only one to several years (e.g., short-term response to drought or wildfire) are not invasive plants. Note that unlike other indicators, we are describing what is NOT expected in the reference state for the ecological site:** Bare ground greater than 15% and presence of noxious weeds or creeping meadow foxtail are the most common indicators of a threshold being crossed. Baltic rush, low growing sedges, and willows are common increasers. Canada thistle and foxtail barley are common invasive species.
-
17. **Perennial plant reproductive capability:** All species are capable of reproducing, except in drought years.
-